ISSN 2715 - 6060

Review

PACNJ

Management of Covid-19 among Patients with Comorbid Cardiovascular Disease: A Scoping Review for Decreasing Mortality and Morbidity

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ARTICLE INFO

Article history:
Received 21-03-2021
Received in revised from 27-07-2021
Accepted 02-08-2021

Keyword:
Cardiovascular Disease, Covid-19, Therapy

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ABSTRACT

Cardiovascular disease is comorbid with many Covid-19 patients, with *Case Fatality Rate* (CFR) reaching 10.5%. The efforts made to reduce mortality and morbidity in Covid-19 patients with cardiovascular concomitant diseases are still being executed. This review aimed to identify the interventions and their relation to mortality and morbidity in these patients. This study is s *scoping review*, with *databases* used including *Ebscohost, Goggle Scholar, Pubmed,* and *Proquest.* This study using inclusion criteria: *full-text* and written in English. It is using the keywords *Cardiovascular disease, Covid-19,* and *Pharmacotherapy.* Articles obtained totaling 145,680. Articles were sorted according to various restrictions, and various inclusion criteria obtained 18 articles. *Several treatments* can be used to reduce *mortality* in Covid-19 patients with CVD, they are: the administration of pharmacological drugs such as ACEI, ARB, RAAS inhibitors, and Hydroxychloroquine, statin, and advance cardiogenic shock treatment (MCS, V-A ECMO, and Impella). It discovered some effective treatments in lowering mortality rates. However, these results do not demonstrate consistency. So it is necessary to do more research. In addition, nurses need to develop nursing therapies that can synergize with medical therapies in improving the efficacy of treatment and lower mortality and morbidity in patients.

Introduction

Covid-19 is a disease caused by a new type of coronavirus. This virus first appeared in Wuhan, China, at the end of 2019. As of February 26, 2021, there were 112,456,453 confirmed cases of Covid-19 in the world, with a death toll of 2,497,514 (WHO, 2021). Everyone is susceptible to contracting Covid-19 because of the fast spread process, especially people with problems in the cardiovascular system (Cheng, 2020).

Cardiovascular disease (CVD) is a comorbid condition suffered by many Covid-19 patients (Cheng, 2020) with a case fatality rate (CFR) of 10.5% (Dan, Pant, & Upadhyay, 2020). This condition indirectly urges Covid-19 patients with CVD to require intensive care and ventilators for a long time (Prabhakaran et al., 2020; Rey et al., 2020). Covid-19 patients with comorbid CVD have a mortality rate three times greater than patients without comorbidities (Prabhakaran et al., 2020; Shi et al., 2020). Different potential pathophysiological mechanisms in Covid-19 patients with CVD may increase the risk of complications: thrombolysis, increased oxygen demand, microvascular ischemic injury, and increased troponin might lead to death (Cheng, 2020; Dan et al., 2020; Prabhakaran et al., 2012). al., 2020; Rey et al., 2020).

Various factors influence the high mortality rate of Covid-19 patients with CVD. These factors consist of: a sudden and rapid worsening of the clinical condition of Covid-19 patients, the severity of the accompanying CVD, the patient's level of immunity, the availability of supporting facilities for invasive measures, treatment guidelines - which are still a question of effectiveness - and the number of available human resources (Cheng, 2020; Prabhakaran et al., 2020). The management of Covid-19 patients with CVD has a specific algorithm. Since usually, Covid-19 patients have contraindications with several interventions or treatments that were usually done before the Covid-19 pandemic occurs. So nurses need to be knowledgeable about the management of Covid-19 patients with comorbid CVD to prevent a sudden worsening of the patient's clinical condition and assist in their treatment to diminish mortality and morbidity of Covid-19 patients with CVD.

Currently, there is insufficient literature that discusses the management of Covid-19 patients with CVD. The various Covid-19 treatments that have been carried out still have not been widely proven regarding their effectiveness. Therefore, this literature review was constituted to find out the treatments that had been carried out, including its consequences for patients Covid-19 with CVD comorbid.

Method

This study is a scoping review used as an analytical review to identify the types of evidence available according to the topics discussed—studies related to effective management in reducing death or improving the healing process. The article search strategy in this study consisted of several steps. The first step is to enter the keywords listed in Table 3.1 into the electronic database sources, such as Ebscohost, Pubmed, Proquest, and search engine Goggle Scholar and obtained as many as 145,680 articles.

Table 1. Article search keywords

Keywords
Covid-19 AND ("cardiovascular diseases" OR cardiology OR heart disease OR hypertension) AND Therapy OR therapeutic OR therapies OR treatment OR treatments OR "Therapy drug" OR "Drug Therapies" OR pharmacotherapy OR pharmacotherapies AND (Mortality OR mortalities OR mortalities rate") AND (morbidity OR morbidities)

The next step was that articles were selected using the inclusion criteria in Table 3.2 and obtained as many as 46 articles. The criteria for selecting articles in this study were the type of article, language, and year of publication.

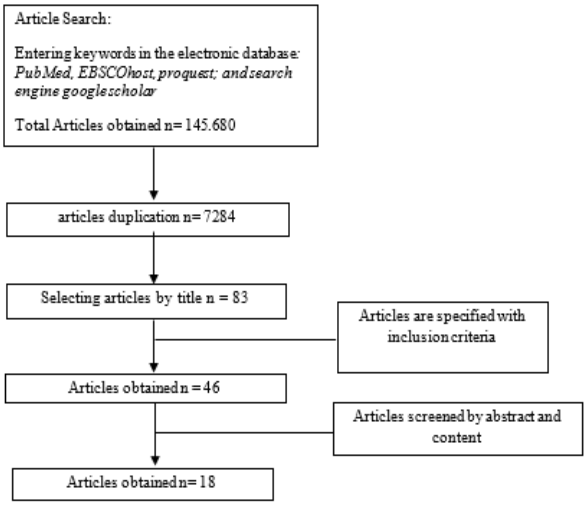
Table 2. Inclusion and Exclusion Criteria

Criteria	Inclusion
Article type	Full-Text
Language	English
Publication Year	2019-2021 (last two years)

Table 3. Search Strategy

Database/Search engine used	Total articles according to keywords	Total articles based on inclusion criteria	Articles selected based on abstract and content
PubMed	1148	29	16
EBSCOhost	31	8	1
Proquest	139.041	9	1
Google Scholar	5460	0	0
Total	**145.680**	**46**	**18**

Figure 1. Selection flow



Results

Based on the search results obtained, 18 articles meet the objectives of this study. From these articles, it is known that the types of research designs that have been carried out include quantitative research with a cross-sectional, retrospective, case-control, single-center case, retrospective multicenter, cohort, and retrospective observational approach. Also, review: brief review, review article, systematic review, and meta-analysis.

The identified treatments include the provision of ACEI/ARB therapy. ACEI/ARB is provided to patients who have cardiovascular disease, mainly in hypertensive patients with Covid-19. ACEI/ARB has been used since the initial diagnosis of hypertension with Covid-19 constitute. This ACEI/ARB is used by involving antiviral therapy to reduce the replica of the covid virus, prevent pulmonary edema, and prevent a decrease in lung function by lowering ACE2, which is the SAR-CoV-2 cellular receptor. Increased ACE2 can increase angiotensin II levels, leading to symptoms of ARDS, hypoxemia, Vasopkegia, and ventilation/perfusion ratio (V/Q) mismatch. However, ACEI/ARB will be more effective if used in conjunction with other medical therapies such as statins, beta-blockers, and antiplatelet agents according to the patient's hemodynamic status (Li et al, 2020). However, ACEI/ARB can also be given to COVID-19 patients with cardiovascular risk factors as a preventive measure. ACEI/ARB is used in hypertensive patients and patients with comorbid CHD, DM, ACS, heart failure, coronary artery disease, history of arrhythmias, and COPD. Nevertheless, in patients with chronic obstruction, it is better to use ARB than ACEI (Li et al, 2020).

The use of ACE/ARB with RAAS inhibitors can be used as an effort to prevent the severity of hypertension with Covid through inhibition of the ACE/Ang II/AT1R system. The RAAS plays a vital role in regulating hypertension and acute lung injury

caused by viruses, such as SARS and H7N9. The RAAS also serves as a preventive measure against the potential involvement of systemic inflammation in cardiac injury in patients infected with COVID-19. However, it should be noted that the collaborative use of ACE/ARB with RAAS has side effects that directly play a role in the renin-angiotensin-aldosterone mechanism so that its effects can cause kidney disorders, decreased blood pressure, hypokalemia, and death (Makani et al, 2013).

The use of ACE/ARB with RAAS inhibitors can be used to prevent the severity of hypertension with Covid through inhibition of the ACE/Ang II/AT1R system. The RAAS plays a vital role in regulating hypertension and acute lung injury caused by viruses, such as SARS and H7N9. The RAAS also serves as a preventive measure against the potential involvement of systemic inflammation in cardiac injury in patients infected with COVID-19. However, it should be noticed that the collaborative use of ACE/ARB with RAAS provides side effects. Which directly plays a role in the renin-angiotensin-aldosterone mechanism so that its effects initiate kidney disorders, decreased blood pressure, hypokalemia, and death (Makani et al, 2013). The use of ACEI/ARB as a treatment for Covid-19 with a cardiovascular disease does not affect mortality or disease progression. On the other hand, ACEI/ARB may benefit in reducing mortality in cardiovascular Covid-19 patients (Linelejan, B et al, 2021). Other complications are myocarditis, acute myocardial infarction, acute heart failure, thromboembolism, and arrhythmias. In Covid-19 patients with cardiovascular comorbidities, optimization of medical therapy needs to be prioritized. Emergency intervention measures may be considered in selected cases with hemodynamic instability (Willim, H.A et al, 2020).

Another treatment is Mechanical circulatory support (MCS) which is used in Covid-19 patients with cardiogenic shock. This MCS is more effective in younger patients with few comorbid diseases and has a high life expectancy. In addition to MCS in Covid-19 patients with cardiogenic shock, therapy modalities can also be given: Venoarterial ECM, Short Term Ventricular Assist Devices (V-A ECMO). The use of ECMO needs to pay attention to the risks that will be caused. Peripheral arterial cannulation may cause ischemia in the extremities, thus cause differential hypoxemia in the presence of hypoxemic respiratory failure. Therefore, this needs to be considered in giving V-A ECMO to Covid-19 patients with cardiogenic shock (Rajagopal et al, 2020).

In addition to MCS and VA ECMO management in Covid-19 patients with cardiogenic shock, Impella can also be given. Impela is a tool installed in the left ventricle that is useful for helping a more homogeneous distribution of blood flow to the systemic circulation so that it can be more effective in reducing LVEDV and reducing pressure—left ventricular diastolic and systolic. However, it is not sufficient to use VV ECMO alone in acutely ill patients because recirculation of VV ECMO can be exacerbated by decreased RVEF and tricuspid regurgitation. RV support can be performed through a femoro-femoral approach, oxygen, and the use of a single cannula to maximize peripheral cannulation through a single site with minimal recirculation (Rajagopal et al, 2020). Another treatment that is executed is PCI. PCI is performed on STEMI patients with low-risk Covid-19 or high-risk Covid-19. Meanwhile, in NSTEMI patients with low-risk COVID-

19, curative management can be used (Prabhakara et al, 2020).

Another treatment is the administration of drugs. Administration of the drug Lopinavir/ritonavir: warfarin, DOACs, P2Y12 inhibitors, statins commonly used in covid-19 patients with cardiovascular problems. Lopinavir produces side effects such as nausea and vomiting, so lopinavir is still in the stage of further research. Another drug is Hydroxychloroquine, and chloroquine is also used to increase antiviral activity. Furthermore, proven chloroquine is more potent in inhibiting SARS-COV-2 than Hydroxychloroquine. Side effects that need to be observed in the administration of Hydroxychloroquine and chloroquine are increased beta-blocker work and the risk of bradycardia, a pro extension of PR intervals and atrioventricular blocks. Also, it may cause severe hypoglycemia, erythroderma, hematological disorders, and mental disorders. Thus in anticipation of these necessary side effects, regular monitoring of complete blood count and AGD. While, remdesivir drugs, Tocilizumab: warfarin, DOACs, P2Y12 inhibitors, statins can be used for cardiovascular patients with Covid-19. In hypertensive patients with Covid-19 can also consume Statins that have anti-inflammation and lower cholesterol levels. Those treatments that have been identified proven effective in lowering mortality rates in cardiovascular patients with Covid-19. However, several articles mention that the use of ACEI / ARB can worsen the condition of Covid-19 patients with cardiovascular patients (Ye et al, 2020).

Table 4. Data Extraction

No	Title	Author	Research Design	Management
1	Cardiovascular disease, drug therapy, and mortality in Covid-19	(Mehra et al, 2020)	Quantitative *(Cross-Sectional)*	**Use of ACE inhibitors and ARBs:** Effect on reducing mortality in patients with cardiovascular disease (94.2%)
2	Cardiovascular Considerations in Treating Patients With Coronavirus Disease 2019 (Covid-19)	(Dixon et al, 2020)	Systematic Review	1. Administration of Covid-19 drugs with drugs for cardiovascular disorders - Lopinavir/ritonavir: warfarin, DOACs, P2Y12 inhibitors, statins. - Hydroxychloroquine, chloroquine: beta-blockers, QTc prolonging agent - Remdesivir Tocilizumab: warfarin, DOACs, P2Y12 inhibitors, statins 2. Treatment for covid - Antiviral therapy - *Hydroxychloroquine* and *Chloroquine.* 3. Use of the Renin-Angiotensin-Aldosterone Inhibitor System. 4. Statin potential for lowering cholesterol levels
3	Association of Renin-Angiotensin System Inhibitors with Severity or Risk of Death in Patients with Hypertension Hospitalized for Coronavirus Disease 2019 (COVID-19) Infection in Wuhan, China	(Li et al, 2020)	*Retrospective, single-center case*	**The use of ACE inhibitors and ARB** does not affect the severity and mortality of Covid-19 patients with hypertension
4	Good or bad: Application of RAAS inhibitors in COVID-19 patients with cardiovascular comorbidities	(Jiqi et al, 2020)	*Brief Review*	**The use of RAAS inhibitors** has an effect on reducing the mortality rate of Covid-19 patients with sympathetic cardiovascular disease **The use of ACE and ARB** has an effect on reducing the mortality rate of Covid-19 patients with sympathetic cardiovascular disease
5	Of Inpatient Use Of Angiotensin-Converting Enzyme Inhibitors And Angiotensin II Receptor Blocker With Mortality	(Zhang et al, 2020)	Retrospective Study	**The use of ACE and ARB** Affects reducing the mortality rate of Covid-19 patients with sympathetic cardiovascular disease

	Among Patients With Hypertension Hospitalized With COVID-19			
6	Renin-angiotensin system inhibitors improve the clinical outcomes of COVID 19 patient with hypertentions	(Meng et al, 2020)	Retrospective Study	**The use of RAAS inhibitors** Affects reducing mortality in Covid-19 patients with hypertension
7	Crosstalk between coronavirus disease 2019 and cardiovascular disease and its treatment	**(**Ye et al, 2020)		**The use of ACEIs and ARBs** Can worsen the condition of covid patients with CVD
8	Predictors of severe or lethal COVID-19, including Angiotensin Converting Enzyme inhibitors and Angiotensin II Receptor Blockers, in a sample of infected Italian Citizens	(Bravi et al, 2020)	Case-Control	**The use of ACEIs and ARBs** Has an effect on increasing the conversion of Angiotensin II to Angiotensin 1-7 and as an anti-inflammatory in suspected cardiovascular patients Covid-19
9	Decreased Mortality of COVID-19 With Renin-Angiotensin-Aldosterone System Inhibitors Therapy in Patients With Hypertension: A Meta-Analysis	(Guo et al, 2020)	Meta-Analysis	**The use of ACEIs and ARBs and RAAS inhibitor** Affects reducing the mortality rate of Covid-19 patients with hypertension
10	Diagnosis and treatment strategy of coronavirus disease 2019 with cardiovascular disease in elderly patients	(Biao Cheng, 2020)	-	**Treatment for Covid-19** 1. CT scan (Computed Tomography) 2. Nucleic Acid Test 3. Antiviral therapy (chloroquine phosphate, lopinavir/ritonavir, and remdesivir) 4. Prophylactic antibiotics, glucocorticoids in severe Covid-19, antibody plasma,

				and traditional Chinese medicine **Treatment for Cardiovascular** 1. Chronic heart failure, diuretics (up to 2000 mL in 24 hours), beta-blockers, angiotensin receptor-neprilysin inhibitors, ARBs, and ACEIs 2. AMI: an oral medication, nitrate preparations, dopamine plus sodium nitrate static drops 3. Acute left heart failure: cardiotonic, diuretic, and vasodilator; 4. Ventricular arrhythmias: beta-blockers, amiodarone, defibrillation
11	Pros and cons for the use of statins in people with coronavirus disease-19 (COVID-19)	(Ray et al,2020)	-	**The use of De-novo statin c**an be used for the treatment of SARS-CoV2, but de-nevo statin use is used only in clinical trial settings
12	Renin-angiotensin system inhibitors in the management of hypertension during the COVID-19 pandemic.	(D. Dworakowska, A.B. Grossman, 2020)	*Review article*	**The use of ARBs and ACBs** influential in reducing mortality in Covid patients with hypertension
13	Cardiovascular disease and Covid-19: Implication for prevention, surveillance, and treatment	**(**Neal A Chatterjee & Richard K Cheng, 2020)	Quantitative	Perform primary prevention and isolation and administration of anti-inflammatory in cardiovascular patients with Covid-19
14	Redefining Cardiac Biomarkers In Predicting Mortality of Inpatients with Covid19	(Juan-Juan Qin et al, 2020)	Retrospective multicenter cohort	**The use of ACEi and Angiotensin II Receptor Blockers:** lower risk of death in Covid-19 patients with hypertension
15	Heart Failure in Covid-19 patient: Prevalence, Incidence and Prognostic Implications	(Juan et al, 2020)	Retrospective Observation	Discontinuation of treatment with ACEIs/ARBs, beta-blockers, and MRAs in heart failure patients the chronic disease was associated with higher mortality during follow-up.
16	Advanced Pulmonary and Cardiac Support of Covid-19 Patients: Emerging	(Rajagopal et al., 2020)	-	1. Mechanical circulatory support (MCS) for Covid-19 patients with shock 2. Therapeutic modalities: Venoarterial ECM, Short Term Ventricular Assist Devices V-A ECMO

	Recommendations From ASAIO – "a Living Working Document)			3. Short-Term Paracorporeal Left Ventricular Assist Devices With Either Central or Peripheral Cannulation; Short-Term Catheter-Mounted Left Ventricular Assist Devices (Impella). 4. Right Ventricular (RV) Support
17	Management of Cardiovascular disease Patients With Confirmed or Suspected Covid-19 in Limited Resource Settings	(Prabhakaran et al., 2020)	-	1. Administration of Hydroxychloroquine (HA) or azithromycin (AZ) for Covid-19 19 shown to prolong the QTc. interval
18	QT interval prolongation and torsade de pointes in patients with COVID-19 treated with hydroxychloroquine/azithromycin	(Chorin et al., 2020)	Retrospective Study	Administration of Hydroxychloroquine (HA) or azithromycin (AZ) for Covid-19 19 shown to prolong the QTc interval

Discussion

Based on literature identified that the mortality rate in the management of Covid-19 patients with cardiovascular problems, higher occurs in elderly patients over 60 years old. In Covid-19 with cardiovascular diseases cases, high mortality rates occur due to heart injury caused by pneumonia. At the same time, there are viral infections that initiate CVD events such as acute coronary syndrome and arrhythmias. The existence of these three problems causes difficulties in determining diagnostic strategies. Research conducted by Juan R. Rey et al. (2020) mentions that Covid-19 patients with CVD and severe acute heart failure are associated with very high mortality rates. Patients with a history of chronic heart failure tend to experience acute decompensation after being diagnosed with Covid-19. Covid-19 patients with CVD should receive strict treatment following the guidelines to provide additional protection. The management that can be performed in Covid-19 patients with CVD are as follows:

a. Primary prevention

Covid-19 patients with a history of CVD are recommended to be isolated with more close monitoring. The role of nurses as caregivers is needed in the process of monitoring hemodynamics and determining the presence of emergencies in patients. Providing education to patients with CVD comorbid related clinical manifestations of the disease is also crucial. The emergency can be detected early; thus, the treatment can be given immediately. Covid-19 has an incubation period of approximately five days with fever, dry cough, shortness of breath, and myalgia, but some patients come with complaints of diarrhea, nausea, vomiting, and headaches. Management of Covid-19 patients with CVD varies greatly. This situation is because each CVD has its management. In general, the management of Covid-19 patients with CVD is to take notice of the use of Personal Protective Equipment, facilities, and availability of existing human resources (Prabhakaran et al., 2020; Rajagopal et al., 2020). As much as possible, health workers who interact with patients either unconfirmed or become suspects should still implement health protocols.

b. General management of Covid-19 with CVD

In general, Covid-19 patient management with CVD shows the same guideline as pre-pandemic management. However, nurses in carrying out the nursing care process must understand the differences in the management of Covid-19 patients with CVD. What needs to be done by the nurse is to see the patient's condition, whether it falls into the category of stable or unstable, requires special treatment with invasive actions or not, and others. For example, in patients with hypertension, when recommended to use ACE inhibitors to control hypertension, it should still be considered possible side effects such as hypotension, kidney disorders, and even the risk of death (Prabhakaran et al., 2020).

c. Antivirus Usage

The initial approach to treatment has involved antiviral therapy in reducing viral replication that represents the main pathogenic mechanisms and prevents viruses from entering the body or preventing the fusion of viruses/cells and glycosylation of cellular receptors, e.g., with remdesivir. On the other hand, some therapies still do not clarify their effectiveness in treating patients with Covid-19. Those therapies are the use of Hydroxychloroquine (HA) or azithromycin (AZ) drugs. Some studies mentioned that the drugs could prevent the complications of the Covid-19 in the infected body. However,

Chorin et al. (2020) mentioned that the use of such drugs has an impact on the extension of the QT wave and the occurrence of torsade de pointes. So that, the role of nurses is essential in reviewing the condition of patients before administration of drugs; by paying attention to the patients age, the use of other drugs such as amiodarone, and the presence of AKI disease or acute kidney injury.

In addition, lopinavir as an antiviral can also be used in patients with Covid-19. However in lopinavir use provides side effects such as nausea, vomiting. The nurse must know these side effects in order to be treated immediately. Nurses can collaborate with a doctor for antiemetic administration if these side effects appear.

d. Use of ACE Inhibitors and ARB

The study results from Juan-Juan Qin et al. (2020) mention abnormal cardiac biomarker patterns in Covid-19 patients and are significantly associated with an increased risk of death. Biomarker myocardial fluctuations should be monitored intensively, and patients with elevated levels of such biomarkers should intervene quickly to improve the prognosis. Inpatients using ACE inhibitors or angiotensin II receptor inhibitors significantly had a lower risk of death compared to patients with hypertension who did not use this drug. Other reports showed that Covid-19 patients with hypertension had a lower tendency to IL-6 levels compared to patients from the ACEI /ARB user group.

Angiotensin-altering enzyme inhibitors (ACEI) and angiotensin II receptor inhibitors (ARB) are part of the SystemRenin-angiotensin-aldosterone Inhibitor System (RAAS) system inhibitors. ACEI and ARB are used to improve the regulation of ACE2 receptors, which are found in vascular endothelial cells of the heart, kidneys, and lungs. ACE 2 COVID-19 patients in ICU are higher than patients with COVID-19 who are not in the ICU. It is suggested that the severity of the disease may be related to a problem in the regulation of ACE 2. Some COVID-19 patients also have an imbalance in the renin-angiotensin-aldosterone system (RAAS). It is known that ACE inhibitors (ACEIs) and angiotensin II receptor blockers (ARBs) are widely sed to regulate RAAS.

e. Use of ACE inhibitors and statins

ACE/ARB therapy is not used then; ACE2 may cause pulmonary edema and reduce lung function. This condition indicates that recommendations for the use of ACEI/ARBS are still allowed in Covid-19 patients with hypertension to prevent lung edema and decreased lung function. However, statins have a potential role in reducing the entry of viruses into cells by disrupting cholesterol bridges in the cell walls in a balanced manner. The benefit-risk ratio for the use of statins in Covid-19 patients is still controversial. Statins should be discontinued if there is myositis and/or liver dysfunction, and the dose should be appropriately reduced when drugs that inhibit the cytochrome P-450 system are used. The use of de-novo statins in people with Covid-19may be beneficial, but it still needs further research. Theoretically, pleiotropic properties of statins, including immunomodulatory, anti-inflammatory, anti-thrombotic, and anti-oxidant effects, may reduce the severity of SARS-CoV2. Until further evidence of the ongoing trial is found, the de-novo statin drug for patients Covid-19 can still be administered.

Other studies mention the use of ACEI / ARBs decreases the mortality rate in patients with Covid-19, specifically with CVD. If this therapeutic regimen is not given, it will appear signs of symptoms angiotensin II that increases the level of Ang II causing

symptoms of ARDS, including hypoxemia, vasoplegia, and ventilation/perfusion ratio (V/Q) mismatch. Administration of statins with ACE inhibitors is associated with better survival among patients Covid-19 with comorbid cardiovascular disease.

f. Advanced management

ECG monitoring is recommended to monitor cardiac arrhythmias. In addition, Covid-19 patients have shock, especially cardiogenic shock. Health workers may consider installing several tools such as MCS, V-A ECMO, and Impella in helping to fulfill the circulation of Covid-19 patients.

Another effort related to handling activity disorders of heart failure sufferers during the Covid-19 pandemic is to improve health in self-care management to consider the physical and psychic aspects. Physically it is through medications to prevent unwanted symptoms such as fatigue that will affect the quality of life. Perawat can play a role in providing therapy, one of which is progressive muscle *relaxation* to overcome fatigue problems for people with heart disease through a physical and emotional approach.

g. Role of nurse

Nurses are essential to know the mechanisms, side effects, and complications of drug-related administration. It is reinforced by the varies of treatment or treatment for Covid-19 patients with CVD can be influential when the therapy interacts with each other. Nurses can play a role in reducing mortality and morbidity in patients with CVD with Covid-19. In each treatment process, nurses can review and anticipate and prevent emergency responses or side effects of any treatment performed. Nurses will recognize earlier changes in patients so that the patient's worsening condition can be minimized by reporting and collaborating with the doctor whether considering, replacing, and combining the treatment of certain medications.

Conclusions

There are several effective treatments in lowering mortality rates in covid-19 patients with comorbid cardiovascular disease. These therapies consist of: Antivirals; ACE Inhibitors and ARB; ACE inhibitors and statins; MCS, V-A ECMO, and Impella. However, some studies mention that the therapy does not affect decreasing the severity and mortality of patients. Furthermore, it is even mentioned that ACEI and ARB can worsen the condition of covid patients with CVD. As a nurse whose scope is the patient's response, it is crucial to understand the mechanisms, side effects, and complications related to managing the therapy used. So that in the process of nursing care, nurses can appraise the response of treatment and anticipate the presence of emergency or side effects of the provision of therapy. Nurses need to develop nursing interventions that can be used in conjunction with the given medical therapies so that optimal results can be achieved better.

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